

REMARKS

Claims 1 and 11 have been amended to recite that the process of the present invention for purifying exhaust gas from gasoline engines includes a step of preparing an exhaust gas purifying-use catalyst for purifying first exhaust gas produced under a driving condition at which an air-fuel ratio is stoichiometric, the exhaust gas purifying-use catalyst being defined in the same terms as previously recited in these claims, and to recite that the second exhaust gas that forms a more oxidizing, low-temperature atmosphere as compared with the first exhaust gas, is controlled so as to have an exhaust-gas temperature which is lower than the first exhaust gas, and which is in a range of 200 to 350°C at the inlet of the catalyst. The amendments to claims 1 and 11 are supported by the description on page 14, second paragraph, to page 15, second paragraph, and page 19, second paragraph, of the specification of the present application and by claim 9.

New claims 15 and 16 have been added to the application. New claim 15 recites that the second exhaust gas is controlled so as to have an exhaust-gas temperature in a range of 200 to 300°C at the inlet of the catalyst. New claim 15 is supported by the description on page 14, second paragraph, to page 15, second paragraph, and page 19, second paragraph, of the specification of

the present application and by claim 10. New claim 16 recites that the second exhaust gas is controlled so that an exhaust-gas temperature of said second exhaust gas is at least 200°C lower than an exhaust-gas temperature of the first exhaust gas, at the inlet of the catalyst. New claim 16 is supported by the description on page 23, paragraphs 1 to 3.

Claims 9 and 10 have been canceled.

Claims 1 to 5 and 7 to 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Patent No. 5,174,111; hereinafter "Nomura") in view of Leyrer et al. (U.S. Patent No. 5,643,542; hereinafter "Leyrer") and legal precedent.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura in view of Leyrer and legal precedent, and further in view of Schmidt (U.S. Patent No. 3,986,350).

II-1) Characteristics of the Present Invention

The process of the present invention is characterized as follows. Namely, in the purification of exhaust gas of a gasoline engine of the fuel-direct-injection type, the second exhaust gas is controlled so as to have a low exhaust-gas temperature at the inlet of the catalyst, which temperature is not more than a predetermined temperature, thereby allowing both the first and second exhaust

gases to be purified with the use of a single exhaust-gas purifying-use catalyst.

With this characteristic of the process of the present invention, it is possible to simplify a process for purifying both exhaust gas produced under conditions at which an air-fuel ratio is stoichiometric, and exhaust gas produced at a lean burn mode.

It has been known that, in a conventional gasoline engine, an exhaust-gas purifying-use catalyst which purifies a first exhaust gas produced under a driving condition at which the air-fuel ratio is stoichiometric cannot purify, in the same manner, a second exhaust gas produced at the lean burn mode.

However, the inventor of the present invention has found the following. Namely, in a fuel-direct-injection type gasoline engine in which the temperature of lean-burn produced exhaust gas (i.e., second exhaust gas) at the inlet of the catalyst is easily made low, it is possible to use the above exhaust-gas purifying-use catalyst for purifying in the same manner both the first and second exhaust gases by controlling the temperature of the second exhaust gas at the inlet of the catalyst such that the temperature is lower than a temperature of exhaust gas produced in a conventional gasoline engine under a lean burn driving condition.

As mentioned below, the controlling process, which is the characteristic of the present invention, and the unexpected effects of the present invention are not at all disclosed or taught in any of, or in any combinations of, the cited references. As such, applicants submit that the claimed invention described in reference to the amended claims of the present invention is non-obvious.

II-2) Comparison with the Cited References

II-2-1) Nomura

First, the Office asserts that the first exhaust gas corresponds to the region B in Fig. 13 of Nomura, and that the second exhaust gas corresponds to the region A in Fig. 13 of Nomura. Further, according to the Office, Nomura describes, with reference to Figs. 1 and 2, and in column 8 (lines 32-36 and lines 46-57), that the second exhaust gas has more oxidized atmosphere, and has a lower temperature at the inlet of the catalyst, as compared with the first exhaust gas.

However, Figs. 1 and 2, and column 8 (lines 32-36) of Nomura cited by the Examiner as the basis of the rejection, do not disclose or teach the temperature, of the exhaust gas from the engine, at the inlet of the catalyst. Applicants, therefore, do not agree with the grounds for the rejection.

Furthermore, column 8 (lines 46-57) of Nomura merely describes purification of an exhaust gas by using an amount of HC (hydrocarbon) included in the exhaust gas from an engine, and does not disclose or teach the temperature of the exhaust gas at the inlet of the catalyst.

The Office acknowledges that Nomura contains no disclosure of the following configurations of the current claims 1 and 11 of the present invention.

(a) The fire-resistant inorganic oxide is active alumina, titania, zirconia, alumina-titania, alumina-zirconia, or titania-zirconia.

(b) The amount of the noble metal is in a range of 0.01 to 50 g/liter with respect to the catalyst volume.

(C) The amount of the fire-resistant inorganic oxide is about 50 to 300 g/liter with respect to the catalyst volume.

(d) A water-soluble compound is used as a source of the noble metal.

(e) The respective temperature ranges of the first and second gases at the inlet of the catalyst.

In regard to (e) (the respective temperature ranges), the Office asserts that optimum temperature ranges are obvious to a

person of ordinary skill in the art (citing *In re Aller*, 105 USPQ 233).

Aller, however, stands for the proposition that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. Nomura does not disclose that the respective temperatures of first and second exhaust gases as defined in the present invention are result effective variables. Moreover, even if it is assumed for the sake of argument that the respective temperatures of first and second exhaust gases are result effective variables, *Aller* does not apply where, as in the present case, the results of such alleged optimization are unexpected. Additionally, the emphasis of the Office upon routine experimentation is contrary to the last sentence of Section 103(a).

Moreover, applicants do not agree with the assertion of the Office regarding optimization of the temperatures of the first and second exhaust gases for the reasons explained in II-1) above.

II-2-2) Leyrer

The Office asserts that the foregoing (a) to (d) are disclosed by Leyrer. However, the Office has not shown that Leyrer discloses or teaches the characteristic of the present invention as explained above in II-1).

II-2-3) Schmidt

As the Office notes, Schmidt discloses that white gold is used as a catalyst for purifying nitrogen oxide in exhaust gas from an internal combustion engine taking methanol fuel. The catalyst, however, is for reducing the nitrogen oxide under a hydrogen-and-carbon monoxide atmosphere, or under a hydrogen atmosphere.

Accordingly, the Schmidt neither discloses nor teaches the purification of exhaust gas under both hyperoxia atmosphere and anoxic atmosphere.

In conclusion, applicants submit that a person of ordinary skill in the art would not have found it obvious to modify the art so as to obtain the above-described characteristic features of the process of the present invention, even by combining the cited references. Removal of the rejections of the claims to the extent that they apply to the claims as amended is in order.

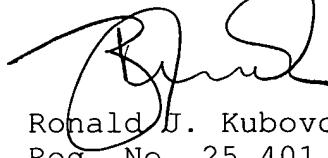
The foregoing is believed to be a complete and proper response to the Office Action dated March 7, 2006, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

KUBOVCIK & KUBOVCIK



Ronald J. Kubovcik
Reg. No. 25,401

Atty. Case No. HARA-072-046
The Farragut Building
Suite 710
900 17th Street, N.W.
Washington, D.C. 20006
Tel: (202) 887-9023
Fax: (202) 887-9093
RJK/jbf